UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/825,582	04/03/2001	Steven R. Reznek	00141	9948

7590 06/04/2003

William F. Dee, Esq.
CABOT CORPORATION
Law Department
157 Concord Road
Billerica, MA 01821

EXAMINER	
WINTER, GENTLE E	
ART UNIT	PAPER NUMBER
1746	6

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/825,582	Applicant(s) REZNEK, STEVEN R.	
	Examiner Gentle E. Winter	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *5,6,15,16 and 30-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-14,17-29 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *5,6,15,16 and 30-34* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *1 & 5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-29 and 35, drawn to a method of making carbon foam, classified in class 443, subclass 445 R.

II. Claim 30, 31 and 34, drawn to an electrode, classified in class 429, subclass 209.

III. Claim 32, drawn to an elastomer compound, classified in class 521, subclass 155.

IV. Claim 33, drawn to a fuel cell, classified in class 429, subclass 12.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and (II-IV) are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as thermal insulating material and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. This application contains claims directed to the following patentably distinct species of the claimed invention:

Pyrolizable material.

a. claim 3 coal

b. claim 5 carbohydrates

c. claim 6 sugar or cellulose

Fuel Source

a. claim 8 natural gas

b. claim 15 liquid

c. claim 16 gas

Electrode

a. claim 31 capacitor

b. claim 34 battery

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 1 and 30 are generic.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

5. As to the species the pyrolizable material --coal-- was elected, with respect to fuel source natural gas was elected.

6. It is noted that the dependant claims, though drawn to patentably distinct inventions include all the limitations of the independent claim and as such upon allowance of the independent claim may be rejoined.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 6,500,401 to Reznek et al. (Reznek).

As to claim 1, 3, 4, 7, 9, 21, disclosing a method of making carbon foam comprising pyrolizing a mixture comprising at least one pyrolizable material in the presence of at least one oxidizing.

As to claim 1, disclosing Reznek discloses a method of making carbon foam comprising pyrolizing a mixture comprising at least one pyrolizable material. Inherently an oxidizing source is present. It is not possible to achieve a completely oxygen-free atmosphere. Therefore, because some oxygen is present in any pyrolysis system, a small amount of oxidation, of necessity, occurs.

As to claims 3, 4, 7, 9, 21, and 35 Reznek and the claims both disclose that the pyrolizing substance is preferably an organic substance such as an organic compound. Examples include, but are not limited to, carbohydrates, coal, and hydrocarbons. Essentially, the substance used is a substance which will pyrolize instead of evaporate when heated. A preferred pyrolizable substance is sugar, cellulose compounds, coal, and the like. Other examples include, but are not limited to, hydrocarbons and polymers and derivatives thereof. See e.g. the abstract and column 2, line 25 *et seq.*

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1-4, 7-14, 17-29 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated Ullman's Encyclopedia of Industrial Chemistry.

As to claims 1 and 10, disclosing a method of making carbon foam comprising pyrolizing a mixture in the presence of at least one oxidizing source. Foam is construed in light of the specification. Page 126 in column 2 discloses the formation of carbon foam (activated carbon). The oxidizing source is disclosed as oxygen.

As to claims 2, 3, 4, and 35, disclosing that a fuel source is present and that the pyrolizable substance comprises coal, the indicated passage discloses coal and the coal serves as the fuel source.

As to claims 7, 8, and 9 disclosing that the fuel source is gaseous, the coal produces carbon dioxide (1000C) which is flammable and gaseous and a natural gas. The coal inherently contains hydrocarbons. The same is disclosed by Ullman see e.g. page 128 section 4.2.3.

As to claims 18 and 19, disclosing that the at least pyrolizable material is introduced by being dispersed in a carrier stream. The same is disclosed at 4.2.1 page 127 starting at first paragraph of the first column, disclosing that in the production of activated carbon numerous different systems may be employed including fluidized bed reactors. Ullman goes on to disclose particle size is a factor that is determinative in system selection. Page 126 also talks about pneumatic delivery, and the need for an inert environment.

As to claim 11, disclosing that the oxidizing material is present in an amount which is between 0.05 and 0.75 of the amount needed to combust completely the pyrolizable material and fuel; and the fuel is present in an amount such that its complete combustion consumes between 0 and

100% of the oxidizable material. Since the complete combustion of the may consume between 0 and 100% of the oxidizable material, and since the oxidizing material is present in an amount which is between 0.05 and 0.75 of the amount needed to combust completely the pyrolizable material and fuel, it follows that figure 21, disclosing oxygen in concentrations between about 0.5% and about 0.75 percent, properly anticipates that claim.

However, it has been construed in light of page 4 line 21 *et seq.* of the specification. That paragraph discloses that the oxidizing source should be sufficient to at least partially combust the fuel but the amount of oxidizing source should be controlled such that the pyrolizable material does not completely combust or burn the pyrolizable material. The amount of oxidizing material needed is in the range of 0.05 to 0.75 of the theoretical amount needed to completely burn all of the fuel and combustible material. In the case where a separate fuel is used, the amount of fuel is such that the fuel combustion consumes between 0 and 100% of the oxidizing material. Seemingly, if the fuel consumes 0% it is no longer fuel. Is there another explanation?

As to claim 12, disclosing that the pyrolizable material, fuel source when present, and oxidizing source are introduced sequentially in any order. Ullman discloses an order in the reference see e.g. 4.2.4.2 page 131, as such the claim limitation is met.

As to claim 13, disclosing that the pyrolizable material, fuel source, and oxidizing source are added as a mixture, Ullman discloses at 4.1 page 125 that the activated carbon includes not only carbon but also small amounts of oxygen and hydrogen. Ullman goes on to disclose that the

materials "are sometimes derived from the raw material" or they can be formed during or after the activation process by the action of air or water vapor. Thereafter Ullman further goes on to enumerate a situation where water might be added to the carbon in a pretreatment step.

As to claim 14, disclosing that at least one pyrolizable material is introduced into a combustion chamber by being dispersed in said fuel source when present or said oxidizing source or both. Throughout the literature and in Ullman, the pyrolizable material is disclosed to serve in a dual role, fuel source and pyrolizable material see e.g. 4.2.3 on page 128. Also see comments with respect to claim 13 above.

As to claim 17, further limiting claim 2 and disclosing that the fuel source and said oxidizing source are introduced into a combustion chamber prior the introduction of at least one pyrolizable material and wherein said fuel source and oxidizing source are ignited prior to introducing said at least one pyrolizable material into said chamber. The rotary kiln of figure 23, and relevant associated text in Ullman disclose that the steam, gas, and air are fed into the kiln and the ignition occurs within the kiln. The carbon is added to the hot kiln and is gradually moved from the coal inlet to the activated carbon outlet. Thus the pyrolizable material is added after the fuel source and said oxidizing source.

As to claim 18, disclosing that at least pyrolizable material is introduced by being dispersed in a carrier stream. This technique is inherent in the fluidized bed furnace disclosed by Ullman in figure 25 and relevant associated text. The dispersion of the powdered carbon can be readily

prepared by metering powdered coal and required solvent into a suitable vessel equipped with mixing means and stirring the mixture until a uniform suspension is obtained. The resulting suspension is thereafter conveyed to the furnace by pumping. The activating gases are disclosed to introduced into the spaces between the fluidized layers and, more importantly into the circulatory system. See page 130 first full paragraph.

As to claims 19 and 20, further limiting claim 18 and disclosing that the carrier stream is an inert gas. The specification refers to a "neutral gas", Ullman refers to an "oxygen free gas" which is contextually inert. See e.g. 4.2.5 on page 132. Ullman also disclose a first step using *inter alia* an oxygen containing gas. See page 130 first full paragraph and discussion with respect to claim 18 above.

As to claims 21, disclosing that said pyrolizing occurs at a temperature from about 300C to about 1600C. As an initial matter this is a fact that could be Officially noticed, nonetheless 4.2.1 under the subheading discloses 800-1000C, additional temperature ranges are disclosed in figure 24. Under section 4.2.4.2 beginning on page 131 a carrier gas is disclosed. The carrier gas is disclosed as a "mild oxidizing agent". Further on the reference discloses utilizing oxygen and air to aid in the gas activation.

As to claims 22 and 23, disclosing the carbon foam formed by claims 1 and 2, since the same steps are disclosed, inherently the same product would result.

As to claim 24, 25, and 26, further limiting claim 22, and disclosing that the carbon form having cells bordered by thin sheets, windows, struts, or combinations thereof. As an initial matter it is assumed applicant intended "foam" not "form", and "window" is no clearer in the specification than in the claim. The foam cells, inherently have a relatively large surface area per given volume, usually order 1000 m^2/gram. Inherent in such large surface areas are "thin sheets" and openings between the cells etc. The structure results from many well documented phenomena including carbon source. See e.g. page 131, column 2, last full paragraph.

As to claims 27 and 28 further limiting claim 22 and disclosing that the carbon foam is a "thermal insulating material." The material properties of the foam are, of necessity, identical. Consequently the disclosed resulting product is similarly a "thermal insulating material" and is rigid. See page 127, first paragraph, disclosing that the finished product may take many forms including "molded shapes."

As to claim 29 further limiting claim 22 and disclosing a polymer compound including the carbon foam, or fragments thereof. The same is disclosed at 4.2.6. disclosing that the activated carbon powder is used in mineral oil, which is polymeric in the sense of repeating units.

Claim 1, 2, 4, 10, 12, 21-28 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,908,896 to Mayer et al.

As to claim 1, disclosing a method of making carbon foam comprising pyrolizing a mixture comprising at least one pyrolizable material in the presence of at least one oxidizing source. Mayer, in claim 5, discloses pyrolyzing a pyrolyzable material in an oxidizing atmosphere

As to claim 2, disclosing least one fuel source, other than said pyrolizable material is present. This limitation is met as soon as the pyrolizable material is heated between 500-3000C and CO along with other volatiles are vaporized.

As to claim 4, disclosing that the pyrolizable substance is an organic compound, claim 5 of Mayer is drawn to an "organic" microsphere. It is noted that there may be enablement issues related to claim 1 of the instant invention is something other than an organic compound is contemplated. Clarification is cordially requested.

As to claim 10, disclosing that the oxidizing source is air, oxygen, or both, the same is disclosed at see e.g. column 5, line 4 *et seq.*

As to claim 12, disclosing that the pyrolizable material, fuel source when present, and oxidizing source are introduced sequentially in any order. See e.g. column 5, line 1 *et seq.* discloses that the gas flows over the microspheres.

As to claim 21, disclosing that the pyrolizing occurs at a temperature of from about 300C to about 1600C. Mayer at see e.g. column 5, line 1 *et seq.* discloses 600-1200C,

As to claims 22 and 23, claiming the carbon foam formed by the method of claim 1. Since the method is anticipated, and has the same steps, the same product will inherently result. If the argument is made that the process produces a different product applicant may differentiate the claim by reciting an additional step in the independent claim.

As to claims 24 and 25 further limiting claims 22 and 23 respectively, and claiming that carbon the form [foam] has cells bordered by thin sheets, windows, struts, or combinations thereof. The same is inherent in Mayer, see discussion above.

As to claim 26, further limiting claim 22 claiming that the cells have openings between them. Again this is inherent in the activated carbon claimed. See e.g. column 6, line 40 *et seq.*

As to claim 27, disclosing that the carbon foam of claim 22 is rigid. The property follows from the method. Additionally, the beads are used as supports see e.g. column 8, lines 13-50.

As to claim 28, the thermal insulating properties are material properties imparted by the production steps.

As to claim 35, disclosing that he pyrolizable substance comprises at least one hydrocarbon containing material. Resorcinol includes dihydroxybezene, a hydrocarbon.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. United States Patent No. 5,932,185 to Pekala et al. is considered substantially cumulative with Mayer addressed above. It is noted that electrodes are disclosed in this reference.

United States Patent No. 5,300,272 to Simanl discloses a method of making carbon foam and discloses that the same includes a "well interconnected strut morphology" that provides "open porosity."

United States Patent No. 5,476,878 to Pekala discloses an aerogel (carbon foam) having many of the claimed material properties including thermal insulation, and carbon electrodes for energy storage devices, such as batteries and double-layer capacitors.

United States Patent No. 5,945,084 to Droege discloses carbon foams and methods of preparation. The methods include methods which would support 102 and 103 rejections on several of the pending claims. Specifically pyrolysis of an organic polymer under inert atmosphere such as N2 or argon is disclosed. Droege also discloses that the foam has good

electrical conductivity, and that "carbon foams have found wide utility in electrode applications such as energy storage devices (e.g., capacitors and batteries) fuel cells, and electrocapacitive deionization devices. See, for example, Pekala et al., 1995a; Mayer et al., 1994, 1995b, 1995c, 1996, 1997; and Kashmitter et al., 1993 1996. Carbon foams have also found utility in variety of other applications.

United States Patent No. 6,033,506 to Klett discloses additional uses for the carbon foams. The various patents disclose that the phrase "high temperature activation process" refers to a high temperature process that typically results in changes in surface area, porosity and surface chemistry of the treated material due to pyrolysis and/or oxidation of the starting material.

Further, the prior art discloses that in fluidized bed processes, finely divided particulates are suspended or levitated by a moving gas or liquid. The process gas moves and separates the particles and, upon heating, pyrolytic carbon is formed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
Art Unit 1746

June 2, 2003

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700